

Retraction

Retracted: Optimization of Intelligent Management and Monitoring System of Sports Training Hall Based on Internet of Things

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their

agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] H. Qian, "Optimization of Intelligent Management and Monitoring System of Sports Training Hall Based on Internet of Things," *Wireless Communications and Mobile Computing*, vol. 2021, Article ID 1465748, 11 pages, 2021.

Research Article

Optimization of Intelligent Management and Monitoring System of Sports Training Hall Based on Internet of Things

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This paper provides an in-depth analysis and research on the intelligent management and monitoring system of sports training hall through the Internet of Things. Firstly, it introduces the project background of the sports training base stadium service system, analyses the significance of the system development, and describes the related technology and the method of development. The paper then analyses the requirements of the management business of the system and describes the main business processes of the system with activity diagrams; the paper then analyses the functional requirements and data requirements of the system and describes the system with use case diagrams and thumbnail class diagrams, respectively. Based on this, the thesis designs the overall aspect of the system, giving the corresponding total package diagram, and designs all functions one by one, giving the corresponding class diagram, the corresponding sequence diagram, and the corresponding processing flow diagram. The thesis gives the design of database tables by designing entity property diagrams and entity-to-entity relationship diagrams according to the data requirements and system functions. Finally, the research of the thesis is summarized accordingly, stating what has been done, what results have been achieved, what problems still exist, and what further work needs to be done to make the outlook of the work.

1. Introduction

With the development of networks and the progress of science and technology, people began to pay attention to the interaction between things, which evolved to form the Internet of Things (IoT). At present, IoT industry is still in the primary stage of development, and there is still a lot of space for upward and transformation in terms of technological innovation, standard development, and business forms. The Internet of Things industry is the key development of new strategic industries, and based on this environment, the application of the Internet of Things has a very large potential and space [1]. In recent years, IoT technology has gradually matured, focusing on sensors, software, and other aspects, while the rapid development of supporting equipment for IoT, especially intelligent circuits, transmission networks, and other basic equipment. In terms of the current situation, IoT has a wide range of applications, commercial, agricultural, and service industries, playing an extremely important role in urban construction, environmental protec-

tion, urban security, intelligent transportation, etc. This also brings new development opportunities and challenges in various fields, especially in the sports industry, and the use of advanced technology of IoT can bring great technological innovation that can be used to promote the development of sports events [2]. Nowadays, IoT technology has made considerable achievements in the fields of smart cities and the smart industry. Some researchers and entrepreneurs have noticed the great potential of IoT in the field of sports, such as smart stadiums and smart sports apparel. Rowing, as a competitive sport established by the Olympic Games, is mostly played in natural waters, which can improve the cardiovascular and respiratory functions of the human body and play a role in strengthening the body, and is loved by the public [3]. Therefore, there is still a gap in the market for intelligent rowing training equipment that can be filled.

The development of sports events is in the stage of rapid development, but the development of information technology is still relatively lagging, most of the sports event operation only stays in the traditional operation mode, the

organization capacity is limited, the overall operational efficiency is not high, the resource consumption is huge, and these problems seriously restrict the sustainable development of sports events [4]. In the background of the development of Internet information technology, the development of sports events relying on information technology has become a trend, the importance of resource integration and optimization of the whole process of event management has become inevitable, and the Internet of things plays an important role in the field of sports events [5]. This paper selects the application of IOT technology in sports events as the research object, its purpose is to explore the current field of sports events in China, the practical application of IoT technology, and find its shortcomings, and then put forward the corresponding improvement measures, and its research results for all kinds of enterprises and institutions, government agencies, and other institutions engaged in sports events related industries in the research and development of IoT technology, application research, and management personnel [6]. The research results will provide some reference value for various enterprises, government agencies, and other institutions engaged in research and development, application research, and management of IoT technology in sports event-related industries [7].

As an important part of the sports industry, sports events also show that people have the spirit of continuous innovation and challenge, and modern sports events are one of the important symbols of current social progress, civilization development, and economic strength. In today's social life, the process of economic integration and the rapid development of information technology make the combination of the Internet of Things and sports become an important development direction for the development of the sports industry, and "Internet +" sports continue to ferment big data, VR, artificial intelligence, etc. which will be deeply integrated with sports. In the management of large sports events, the full use of IoT technology, to further enhance the level of sports events, to drive the competition management, information management, venue management, and other event-related industrial progress, as well as to promote the construction of sports culture and other aspects, has important practical significance. The research on the application of IOT technology in sports event management is relatively small, and China's research on the application of IoT in this area is still in a blank stage. This research on the application of IOT technology in sports events has yielded theoretical results, which has certain theoretical significance to fill the gap in this area of research.

2. Related Work

In terms of essential properties, the primary function of large stadiums should be to provide venue space, where the main bearing objects are sports and performing arts activities [8]. Based on the historical background of the development of sports events, whether the state invests in the construction or the society raises funds to build large stadiums, the original purpose of the service includes meeting the demand of watching sports competitions [9]. Javed et al. focus on the

public service function of large stadiums from six aspects: fitness facilities, sports organization, physical fitness monitoring, fitness guidance, sports activities, and sports information services [10]. Aithal et al. believe that public stadiums should have six basic functions, such as education, competition, training, viewing, testing, and leisure [11]. Kharel proposed that in nature, the basis of its cognition needs to be based on objective experience, with natural science as the bridge; therefore, drawing on this idea, the research perspective of this paper is to take empirical evidence as the starting point, combining their own practical experience and theory, focusing on the application and development of IoT technology in the industrial field, in the application of the industrial field that needs to recognize the advantages of IoT technology [12]. The convenience and openness of enterprise products as well as services which cannot only promote the further development of industry but also effectively enhance the competitiveness of products [13].

The application of IOT technology to related industries can also reduce the cost of production materials, which is of great significance to the development of industry, and in the future, it is also necessary to continuously increase the depth and breadth of the application of IoT [14]. On the current situation of the application of the Internet of things, the application of Internet of things technology is mostly in the actual production of the application; so, the Internet of things technology based on relevant research needs to strengthen the combination of research and development of technology and industrial development [15]. At present, the application of IOT technology is mostly in the city, and the application in the countryside is very little, which requires government coordination and development. The government needs to increase the investment in the research and application of IoT technology, to develop the application of IoT technology in a balanced way, to regulate the balance of urban and rural development, and to actively develop the application of agricultural IoT technology [16]. In the business requirements, the business aspects are described accordingly, and the main corresponding business processes are drawn. In the functional requirements, a detailed analysis of the use case diagram with the business functions is done through the analysis of roles [17]. In data analysis, the required data is described. In the nonfunctional requirements, the corresponding environmental, performance, and security requirements are described. In the detailed design, the corresponding submodules are designed in functional detail with corresponding package diagrams, corresponding class diagrams, corresponding sequence diagrams, and corresponding activity diagrams, and the database tables are designed in detail with entity attributes and entity relationships.

In summary, although the academic research on IoT technology is relatively active with many published articles, there are only a few articles that apply IoT to sports events, and many important core factors have not been covered. Therefore, in this paper, we want to study all aspects of IoT technology in-depth and analyse the importance and significance of IoT technology in sports event management from national policies, residents' ideology, and practical actions. In our country, the application of IOT technology in sports

event management, although the application of IoT in sports events is not yet widespread, in terms of research content, especially in the context of the rapid development of information technology, the proportion of IoT technology penetration into sports events will be increasingly important; therefore, the research on the application of IOT technology in sports events is particularly important. The construction of a sports training base service management information system cannot only enhance the utilization rate of sports venues and improve the working style of staff but also respond to the service status of the venues in real-time, effectively manage the members, save the cost of venue services, and make the venue services run efficiently, thus improving the economic benefits of the base venues.

3. Optimization Analysis of Intelligent Management and Monitoring System of Sports Training Hall with the Internet of Things

3.1. IoT-Based Sports Training Hall Design. Broadly speaking, the Internet of Things (IoT) emphasizes the use of bar codes, radio frequency identification (RFID), sensors, global positioning systems, laser scanners, and other information sensing devices, following the agreed protocols, to achieve human and human, human and object, and object and object in any time and any place connection (anything, anytime, anywhere), and then can exchange information and communication, to achieve intelligent identification, positioning, tracking, monitoring, and management of a huge network system. The Internet of Things (IoT) is a network in which ordinary objects are interconnected through the medium of the Internet and telecommunication network consultation with the support of new media and technology. As for the problem of design theory in social sports guidance, the IoT technology will be used as an effective path for effective guidance with the help of IoT, because IoT can effectively solve the problem of information collection and utilization rate underground, can realize offsite network connection, realize intelligent management service of multiple sports resources, and implement management and automatic detection in a faster and more convenient way, so that people can participate more conveniently [18]. Internet is the basic element of the IoT technical architecture, there is indispensability, under the loop of the Internet to ensure that the information flow collected by the object is safe, accurate, real-time transmission is the basic guarantee, especially in 5G began to emerge today, and information security is heavy.

The other two important applications of IoT are sensors and intelligent information data processing, which are captured by various identification technologies from the sensor side and then analyzed in the data service management side, and the data is processed and processed to classify, store, and feedback the effective data to meet the different needs of different users. Through the application of computer technology, IoT can control massive data in a timely and effective manner to achieve the connection and communication between people and things, and things and things. The per-

ception layer as the name implies is to perceive things, and it includes such as RFID tags and readers, cameras, infrared, two-dimensional code tags, and another perception levels. In the Internet of Things to identify things, to screen things belongs to the perception layer, which is an important core technology to achieve universal perception in the Internet of Things, and is one of the most important external functions in the Internet of Things architecture [19]. The most core and key inside is the coding layer, only through coding, so that each object has a sticky note of its own, to screen objects effectively and quickly, to achieve rapid identification, and make a choice, as shown in Figure 1.

Through the Internet or communication technology, this will be used as a medium to screen objects in the perception layer and achieve interaction through the network layer. For example, Internet, broadband network, network management system, cloud computing platform, and other components, the infrastructure to achieve the Internet of things is wide coverage of the mobile communication network, at present, with the popularity of the 5G era, the future development of the Internet of things will likely become mainstream, and people's lives will become more intelligent and will also drive a large number of enterprises and people from all walks of life to participate in the Internet of things, to promote the Internet of things technology faster. Simply put, after the previous encoding, each object has its business card; in the network layer, the object will be network communication interoperability; then, how to carry out the effective implementation, this is the application layer involved, the realization of its presentation in front of people's eyes, and the most intuitive is also the most familiar to us which is the supermarket shopping, Taobao buy something coordination letter, etc. It can be effectively based on industry needs, targeted to combine ten intelligent applications of the Internet of Things. The development of the Internet of things is to provide a variety of applications, the use of Internet of things technology, industry information technology needs, fully improve the integration of different industries, the development of high-quality low-cost related information resources, and the use of program solutions to provide effective business models and data security.

NB-IoT is a cellular network connectivity technology designed for IoT, which can be deployed directly on existing 2G, 3G, and 4G networks to achieve a smooth transition and upgrade while reducing deployment costs. The performance comparison of the above two solutions is shown in Table 1.

In Table 1, we just compare some parameters of NB-IoT to our IoT. In summary, both modules can meet the functional and performance requirements of this system. The advantage of using the LoRa module as a communication module is that the communication band is free, no need to be restricted by operators, the signal is only good or bad related to the separate deployment of the gateway, its controllability is greater, the data transmission and reception do not need to go through the operator network, and the privacy is better. However, the LoRa module adopts a self-assembled network structure and builds its gateway, which is unique in dealing with the signal interference and network overlap but cannot provide the same quality of service as the NB-

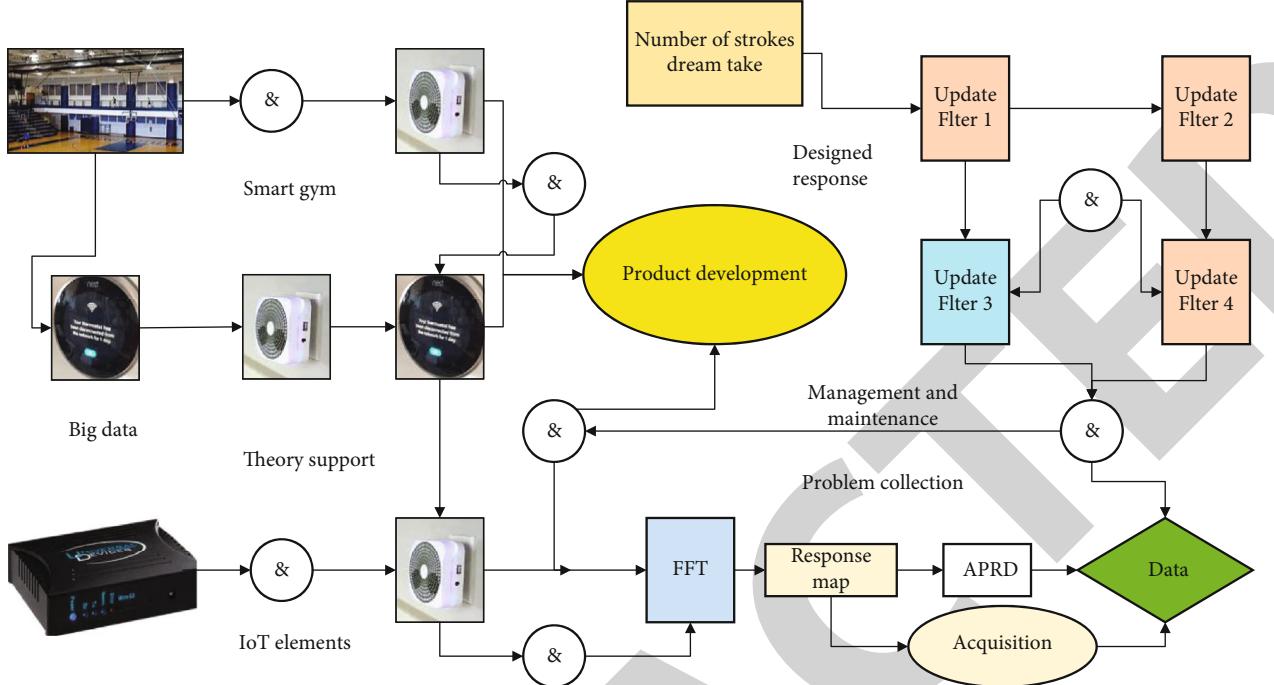


FIGURE 1: Framework of IoT-based sports training hall.

TABLE 1: NB-IoT vs. LoRa module performance comparison.

Long-range IoT technology	NB-IoT	LoRa
Transmission distance	<22 km	<14 km (city 1-2 km)
Networking method	Based on existing cellular network	LoRa-based gateway (self-organizing network)
Frequency band	Carrier band	150 MHz to 1 GHz
Speed	<100 kbps	0.3-50 kbps
Number of connections	200 k/cell	200 k-300 k/hub
Continuity	Approx. 10 years/AA battery	Approx. 10 years/AA battery
Network deployment	Node	Gateway + node

IoT module, and the selection of LoRa gateway location, deployment method, and postmaintenance is also more difficult. Finally, after analysis and comparison, the BC26 model of the NB-IoT module was selected as the wireless communication module for this system.

The resistance value of the strain gauge changes with the ambient temperature. Since the temperature change is the same as the strain gauge coefficient, the resistance value changes by the same amount. At this time, the output voltage value of the bridge is unaffected or less affected, i.e., the output of the bridge is related to the measured strain, thus acting as temperature compensation.

$$U_0 = V_{cc} \cdot \left(\frac{R_1}{R_1 - R_2} + \frac{R_3}{R_3 - R_4} \right). \quad (1)$$

The Kalman filter algorithm for state estimation is implemented using a feedback control method. The Kalman filter is divided into two types of state equations: the time-updated state equation and the measurement-updated state

equation. The time-updated state equation is an estimation equation that derives the current state variables and error covariance estimates based on the state estimates of the previous moment to estimate the state a priori for the latter moment. The measurement update state equation is a correction equation that combines the a priori estimates and the new measurement variables to construct improvements.

Decision-makers of relevant government departments and venue managers need to be cautious about the location of venues, combine the overall layout of the city to plan the construction of venues, based on facts such as resource scarcity and residents' needs, and cooperate with the surrounding infrastructure construction to give full play to the value of large sports venues in the city's functional services. It has been proved that the construction of large sports venues can further promote urban development and drive the rise of related industries around [20]. However, the return on the benefits of the stadium is a long-term business, often requiring a long period of business development to achieve its economic and social value. Therefore, managers should not be too hasty in the process of managing the venues but

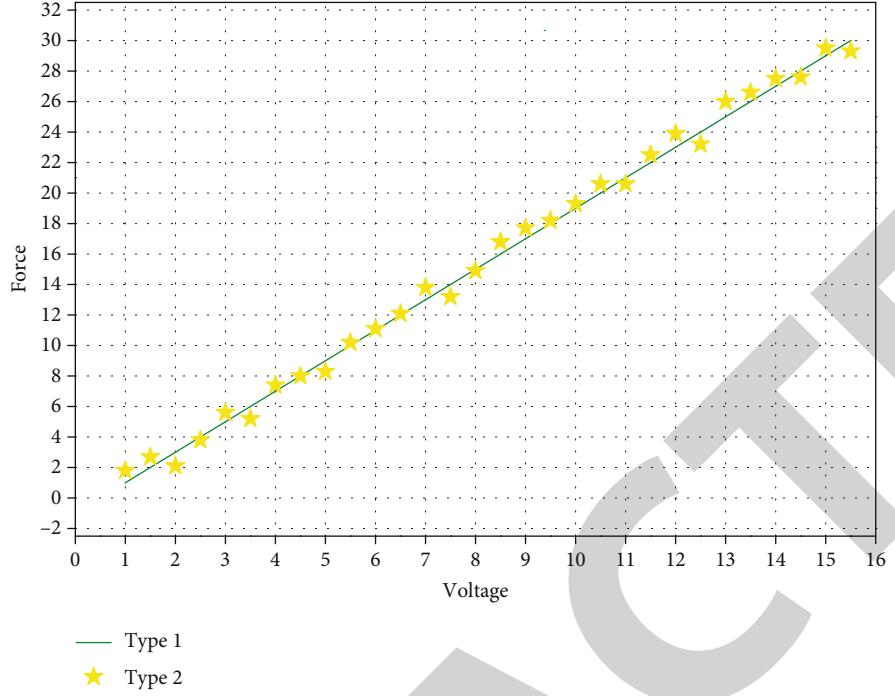


FIGURE 2: Relationship diagram.

should be steady and proactive in seeking market opportunities, attracting the public with quality and professional services, gradually gathering popularity, and thus driving the development of the surrounding industries of the venues. On the other hand, the convenience of public transportation around the venue as an external resource element indirectly affects the convenience of using the venue, as shown in Figure 2.

In Figure 2, type 1 refers to the relational curve of our IoT structure, and type 2 is the relational curve of the IoT section structure from the literature [8]. For the remote location of the venue, in hosting specific large-scale events and cultural performances, the venue management should actively coordinate with other relevant functional departments, to negotiate the possibility of increasing urban traffic. Also, the venue should take the initiative to sense the urgency of the people and think of the people's thoughts, such as the use of additional buses to pick up the audience and staff; in daily use, you can follow the practice of large shopping malls and entertainment centers, to provide scheduled shuttle buses to pick up residents, to provide as convenient as possible for the users of the venue, should also be an open space, reasonable planning, and price concessions for parking lots. It is also necessary to create a parking lot with wide space, reasonable planning, and favorable price to ensure that people who drive to the venue have no worries and make up for the inconvenience of the venue in terms of location and transportation.

The effective realization of the functions of the venue depends on the full consideration before construction, and the venue managers should pay attention to the functional planning and design of the venue. The planning and design of the venue include two situations before construction and renovation: for the planned new venues, full consideration

should be given to the postgame utilization and functional transformation, so that the pregame construction is well thought out, the postgame utilization is in mind, and the transformation can be achieved through demolition to avoid secondary transformation as far as possible, saving human, financial, and material resources costs. For example, Baoneng International Sports and Performing Arts Center fully considers multifunctional use before construction: it has the strongest load-bearing ceiling in Asia, making it the first choice for various cultural and entertainment performances; the main hall is equipped with retractable seats, which is convenient for receiving audiences of different scales; the cement floor is equipped with drainage channels, and the ice room is connected below, which is convenient for the ground to be flexibly transformed into an ice rink to hold related events: the use of mezzanine, sinking, and other. The space design makes the arena have open space for parking, unloading, and loading, and it is convenient for the indoor operation of transportation and signal trucks. For the venues that need to be renovated, we should study excellent cases at home and abroad, listen to the opinions of experienced experts in venue operation and management, venue staff and users, etc., seek the best renovation plan from the needs and practical problems, focus on multiple uses of one venue, and build venues with high practicality and short renovation period.

3.2. Monitoring System Optimization Analysis. Hardware facilities are the necessary material conditions for venues to provide comprehensive functional services, and nowadays, to meet diversified social needs, large stadiums are gradually developing from "body-oriented" single services to "diversified co-existence"; thus, venue managers can guarantee the quantity and quality of sports. Therefore, the venue

managers can guarantee the quantity and quality of hardware facilities, under the premise of enriching the existing venue facilities. First, according to the needs of consumers, the transformation or temporary construction, fully develop the spare space of the venue, set up a variety of sports facilities, to carry out a wealth of sports competitions, sports training, and other activities. Second, you can quickly change the use of the venue through site layout, lighting erection, etc., to undertake recreational performances and other social activities, and the venue will be used live and diligent, to enhance the efficiency of the use of the venue [21]. It should be noted that regular cleaning and maintenance of facilities and equipment protect the personal safety of consumers and ensure the quality of sports services. The establishment of an effective regulatory mechanism, focusing on the use of venues to monitor the use of venues to avoid abuse and overdevelopment, especially the use of professional competition venues, needs to carefully weigh the pros and cons and do not put the cart before the horse.

In this system, to calculate the optimal estimates of acceleration and angle values, the Kalman filtering algorithm is used to solve the weighting relationship between the estimated and measured values, to produce results that are closer to the true values. The Kalman filter algorithm has five state-step equations. The prediction estimation state equation is shown in Equation (2).

$$X(K|K+1) = A \cdot X(K+1|K+2) - B \cdot U(K+1), \quad (2)$$

$$P(K|K+1) = A \cdot P(K+1|K+2)A^T - Q, \quad (3)$$

where $X(K|K-1)$ is the result of the previous state prediction, $X(K-1|K-1)$ is the optimal prediction at the previous moment, $U(K)$ is the control quantity of the present state, A is set equal to 1, and $U(K)$ is equal to 0 in this system, where $P(K|K-1)$ is the covariance of the $X(K|K-1)$ state values, $P(K-1|K-1)$ is the covariance, and Q is the system noise. The equation is updated as shown in Equation (4).

$$X(K|K+1) = P(K-1|K) \cdot Z(K), \quad (4)$$

$$K_g(K) = P(K+1|K) \cdot (P(K+1|K) - R), \quad (5)$$

$$P(K|K-1) = (1 + K_g(K)) \cdot P(K+1|K). \quad (6)$$

The application of IoT technology is to put new high-tech products and thinking into sports events in the development and construction and operation management stages of sports events. It is effective to control costs, improve efficiency, and enhance service quality. With the advent of science and technology and the Internet era, information perception and information technology such as the Internet of Things, cloud computing, the Internet, and mobile Internet have become the basis of industrial development. The main purpose of sports events is to "provide efficient and secure management for users with the high standard of experience." The development and management of sports event resources use the necessary information technology and means to improve the utilization rate and service quality of sports events through

the application of the Internet of Things in the management and development of sports event resources and the analysis of data collected through technology related to sports events to accurately grasp the problems in the process of sports event services. In the management of sports events, the construction of intelligent venues is based on the application of IoT practices in the sports industry important construction. In the intelligent management of sports venues, the information collected can effectively optimize as well as adjust the evaluation index of venues, innovate the content and way of venue service management, promote the standardization of venue services, and promote the construction of national fitness service body and the improvement of policies and regulations [22–26]. The venue center introduces strong Internet technical support, which is combined with the rich front-line operation and management experience of the venue team to promote intelligent services. Integrating mature information technology in all aspects of venue operation and management, the content covers functions such as supervision of national fitness services by government departments, management of large-scale activities at venue sites, management of fitness membership data at venue sites, management of financial assets operation at venues, management of daily operation of venues, sales of goods around venues, and management of sales of goods by partners. In the context of "Internet of things technology Under the background of Internet of Things technology," we build "intelligent venues," improve the intelligent operation management system, make the Internet penetrate all corners of the stadium, and at the same time collect a large amount of data information for analysis, such as booking management data of fitness venues, ticketing and registration information of large activities, cell phone, the big data collection of the client, and website click traces, as shown in Figure 3.

Air membrane stadiums are being used increasingly frequently for their advantages of cost reduction, cleanliness, and energy saving. Air membrane building is a kind of building structure system that uses special building membrane material as the shell, equipped with a set of intelligent mechanical and electrical equipment to provide positive air pressure inside the air membrane building to support the main body of the building, which applies to three ways, such as new stadiums, renovation of outdoor venues, and energy-saving renovation of indoor venues. An air membrane system is built on an existing outdoor stadium site to transform the original outdoor site into an indoor stadium. This allows the renovated venues to be used in different seasons and under various weather conditions, thus improving the sports environment and increasing the opening hours of the venues. And the indoor arena is retrofitted with air membrane energy saving. By reducing the cooling and heating space of the original arena, the cooling and heating costs are significantly reduced, and the total energy costs of the entire arena are significantly reduced. Air membrane stadiums can be used for most sports, such as tennis, basketball, swimming, and hockey. There are many successful cases to learn from, and the construction of an air membrane stadium within 10,000 square meters takes only about 15 days. Modularized intelligent automatic control can be achieved. Research shows that

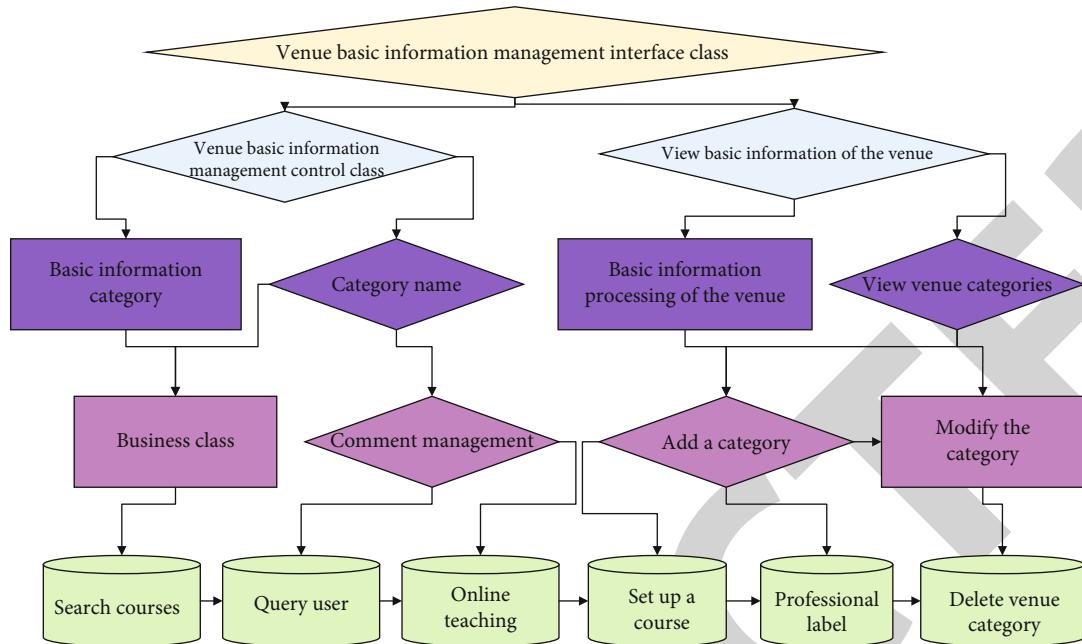


FIGURE 3: Management monitoring optimization design.

the maximum life span of air film stadiums can reach 30 years, with a maximum span of 130 meters and no beams or columns inside. In the patented anchoring system, easy to disassemble, the whole building body is easy to relocate and reusable. The air membrane arena has unique advantages in purification treatment.

4. Analysis of Results

4.1. System Performance Test Result Analysis. The following simulation plots are obtained by MATLAB, which mainly analyze the trend of the number of sensors as the relay distance, sensor distance, and transmit power vary. The power allocation factor is discussed in the previous section to influence the total system throughput (Sum-throughput) during the study; so, the simulations in this section are performed with the optimized parameters.

The effect of different distances between S and R on the total throughput is represented in Figure 4. For comparison, we also perform the average power allocation (MPA, mean power allocation) protocol (MPA-MRC) based on MRC, the average power allocation protocol (MPA-RT) based on indirect transmission (RT, relay transmission), and the direct transmission (DT, direct transmission) based on mean time allocation (MTA) protocol (MTA-DT). As can be seen from the trend of the curves in the figure, there exists a unique d that allows the system to achieve the maximum throughput. As d increases, the closer to d , the greater the system throughput. This is because the relay position gradually approaches the optimal position, and the energy collected by the relay node decreases, but at this time, the system is still limited by the energy collected by the sensor, the greater the channel gain between the relay and the sensor; so, the system throughput improves; in contrast when d is greater than d , the closer to the sensor node, the smaller the channel gains

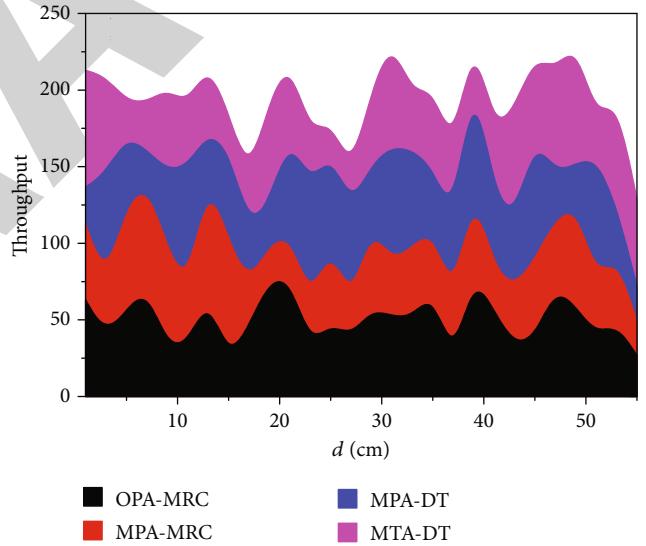


FIGURE 4: Effect of relay location on total throughput.

between the source node and the relay; at this time, the system is limited by the energy collected by the relay; so, the throughput decreases. The coincidence curves show that for all three schemes except the direct transmission method, the total throughput is the same for the sensor energy-constrained case. Notably, the OPA-MRC scheme consistently has the best total throughput, while the other three schemes are worse, and the performance gap becomes more pronounced as d increases.

In the management of sports competitions, there are loopholes in the rules, and active defeat has become a very common phenomenon, but the pursuit of sports competitions is “fair and just competition,” but it is far from enough to rely on sports rules to restrain, which also requires good

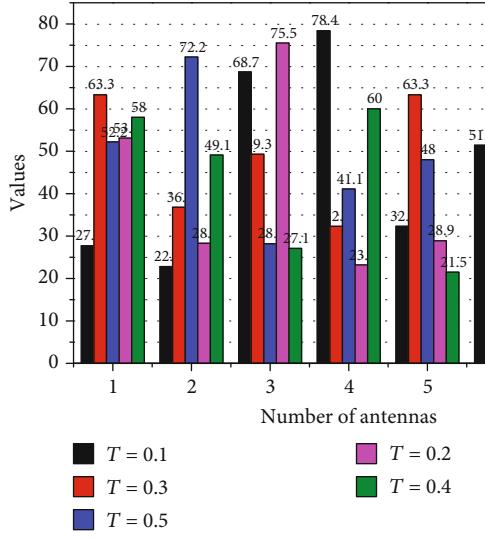


FIGURE 5: Schematic of the average throughput of a single sensor with T .

professional ethics and sportsmanship of athletes, coaches, and referees. The application of the Internet of Things can improve this situation, the Internet of Things technology can transmit the specific information on the field of play to the computer, whether the athletes have the initiative to seek defeat can be understood and mastered, and the important development goal of the application of the Internet of Things in sports events is to improve the environment of sports competition, comply with the Olympic competition, create a fair competition environment, and promote the healthy development of sports, as shown in Figure 5. Sports events are inseparable from the venues and venues, and the venues of sports events are an important condition for the development of sports events. The application of the Internet of Things makes the information construction of sports events' venues more rapid. At the same time, the state has given a lot of support and help in the information construction of sports venues, and there are more than 10 high-level integrated training venues.

In recent years, many large sports events have been held, and in practice, it has been found that the awareness of comprehensive fitness helps to improve the level of competitive sports. The construction of sports event venues is also being enhanced, and Internet technologies such as cloud computing technology, trinetwork convergence technology, Internet of Things technology, mobile Internet technology, and new flat panel display technology are constantly being integrated into the construction of sports venues, which are dedicated to creating intelligent venues. From the current situation of stadium construction, the construction of intelligent venues is still in the primary stage, and there is still a lot of upside in technology and application conditions, as shown in Figure 6.

When the number of sensors is fixed, the four transmission protocols are also increasing with the increase of the sending power of the source nodes, this is because increasing the sending power of the source nodes, the energy collected by the sensor nodes and relay nodes will increase, and this

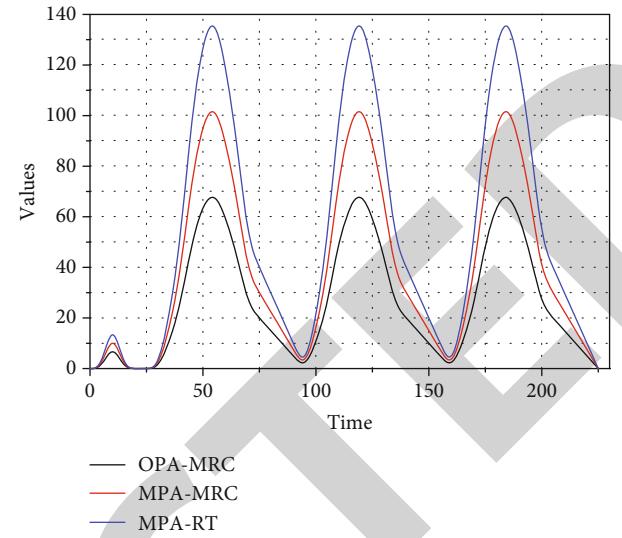


FIGURE 6: Optimal throughput curve with sensor position id.

will increase the power of the sensor nodes and relay nodes in sending the information, leading to the increase of the system throughput. And for the same number of users, the power optimization algorithm in this paper has a greater improvement in the total system throughput compared to the average power algorithm.

4.2. Analysis of Optimization Results. Locust is a distributed user load testing tool, based on python language to write test scripts to load test the server to determine the system that can determine the average response time of the server to user access. Taking the login function as an example, the test URL is <http://59.110.142.44:8080/new2/phone/Login>, and the user makes 200 cumulative requests to the server with an average response time of 30 ms and the fastest response time of 29 ms with 0 failures. The test results are shown in Figure 7. Policy factors and location traffic contain all the secondary elements which are important elements that play a role in the realization of the integrated functions of the two types of venues; at the same time, the managers of both types venues believe that safety and risk control and the overall quality of managers have an important role in the realization of the integrated functions of the venues. Safety and risk control should be given full attention as a service content of the venue; without the guarantee of safety, the realization of any function is empty talk, the results show that most managers attach great importance to safety and risk control factors, and only a few managers need to strengthen the awareness of safety management. In Figure 7, the graphical nature on the right shows the corresponding comparative trend of the servers.

Managers as the navigator of the venue operation, their advanced management consciousness, outstanding working ability, and efficient working style, will be beneficial to the realization of the comprehensive functions of the venue. Institutions are more concerned about sports event resources, while corporate units are more interested in cultural and performing arts resources, which are also closely

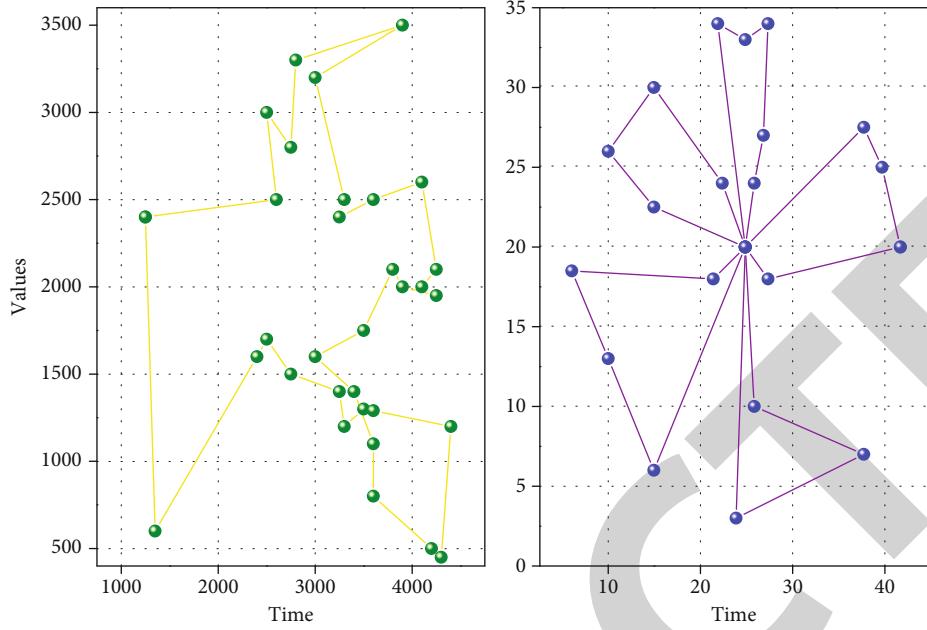


FIGURE 7: Server average response time graph.

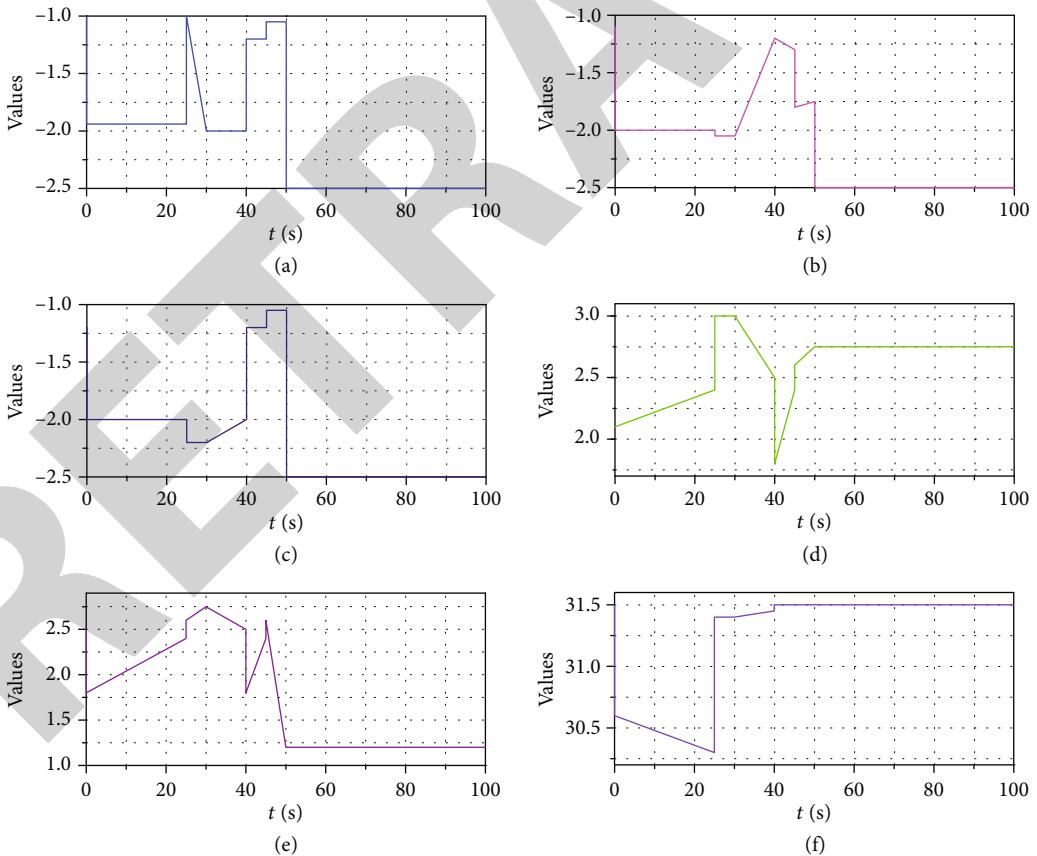


FIGURE 8: Data analysis chart.

related to the management mode and functional positioning of the venues. At present, the number of cultural and performing arts activities undertaken by corporate-type large venues is significantly higher than that of sports events, and

institutions are mainly providing sports services; however, the singularity of functional services will not be conducive to activating the idle resources of the venues and hinder the maximum benefits of the venue, as shown in Figure 8.

The logic of the current system is relatively simple, and the functional complexity of the system is relatively single. If later faced with many collections equipment access, the rowing training system server needs a more efficient framework and logic processing strategy, to ensure the stability and reliability of the connection communication between the oar collection terminal and the rowing training system server, the server, and the handheld terminal, the three. The data in the current system rowing training system server only carry out the simple calculation, processing, and analysis work. In the future, the system can refer to the method of big data analysis, build a professional algorithm model, and analyze the collected sports data comprehensively. Thus, it can provide more professional guidance for rowers.

5. Conclusion

The application of IoT technology has well improved the level and efficiency of sports event management. The application of IOT technology in sports event competition management, event information management, and venue management has built a digital management system and organization, which has comprehensively promoted the level of sports event management, well met the needs of sports event spectators, and provided athletes and coaches with more accurate information and data, so that they can play at a higher level on the field. IoT technology is an innovative change for sports event management, which is very important for the construction of informationization and modernization of sports event management. Sports training base stadium service management system improve the efficiency and make the work simple words, and this paper starts from the actual needs of the ridge sports training base stadium service management from the business process to the use cases, to the data needs, and finally to the environment, performance, security, and other aspects of the demand analysis. From the overall design to the design of each detailed module, the detailed design of each module is carried out through the corresponding package diagram, class diagram of each module, corresponding sequence diagram, and important activity diagram to make the functions more detailed and clearer. Through the attribute diagram of the entities, the relationship diagram is with the entities, followed by the design of the database tables. Our optimization results show a performance improvement of about 10% and an efficiency improvement of about 6% relative to the results of other studies.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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